DL-HW #10

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실행환경: MAC OS TERMIINAL(MACBOOK PRO 2015 RETINA , MOJAVE 10.14.6) , ANACONDA

1. Source Code:

- *Assignment10 폴더 참조*
  (DL_HW_10week_basicRNN.py, DL_HW_10week_LSTM.py, DL_HW_10week_GRU.py)

```
6  sample = "if you want to build a ship, don't drum up people together to collect wood and don't
       assign them tasks and work, but rather teach them to long for the endless immensity of the sea."
7  idx2char = list(set(sample))  #index -> char
8  char2idx = {c: i for i, c in enumerate(idx2char)} #char -> index
9
10 #hyper Parameters
11 dic_size = len(char2idx) #RNN input size (one hot size)
12 hidden_size = 15 #RNN output size
13 num_classes = len(char2idx) #final output size (RNN or softmax, etc)
14 batch_size = 1  #one simple data, one batch
15 sequence_length = len(sample) - 1 #number of lstm rollings( unit #)
16 learning_rate = 0.1
17 epoch = 50
```

9주차 실습 과제물의 일부분을 조금씩 다르게 설정하여 과제를 진행하였다. Sample sentence가 더 긴 문장으로 바뀌었고, 기존의 hidden_size를 15로 고정시켜 주었다.

```
23 #====================HW====================#
24
25 X = tf.placeholder(tf.int32, [None, sequence_length])
26 Y = tf.placeholder(tf.int32, [None, sequence_length])
27
28 X_one_hot = tf.one_hot(X, num_classes)
29
30 #cell = tf.contrib.rnn.BasicRNNCell(num_units = hidden_size)
31 cell = tf.contrib.rnn.BasicLSTMCell(num_units = hidden_size)
32 #cell = tf.contrib.rnn.GRUCell(num_units = hidden_size)
33
34 outputs, _state = tf.nn.dynamic_rnn(cell, X_one_hot , dtype = tf.float32)
35
36 #==========================================#
```

BasicRNN, LSTM, GRU 세가지 모델의 성능차이를 비교해보기 위해 소스코드를 3개로 분리하여 실행해보았다. ("DL_HW_10week_XXXX.py" 에서 XXXX 부분이 사용한 모델을 의미한다.)

2. Result:

3가지 모델(BasicRNN , LSTM, GRU)를 각각 연속적으로 10회씩 실행시켜 결과를 캡쳐 하였다. 각각의 결과 캡쳐 사진은 assignment10/result_of_XXXX 폴더에 정리해 놓았고 XXXX가 사용한 모델의 종류를 의미한다.

➢ BasicRNN(*DL_HW_10week_basicRNN.py*) 실행결과

- Minimum Loss & Correct Sentence (Best Result):

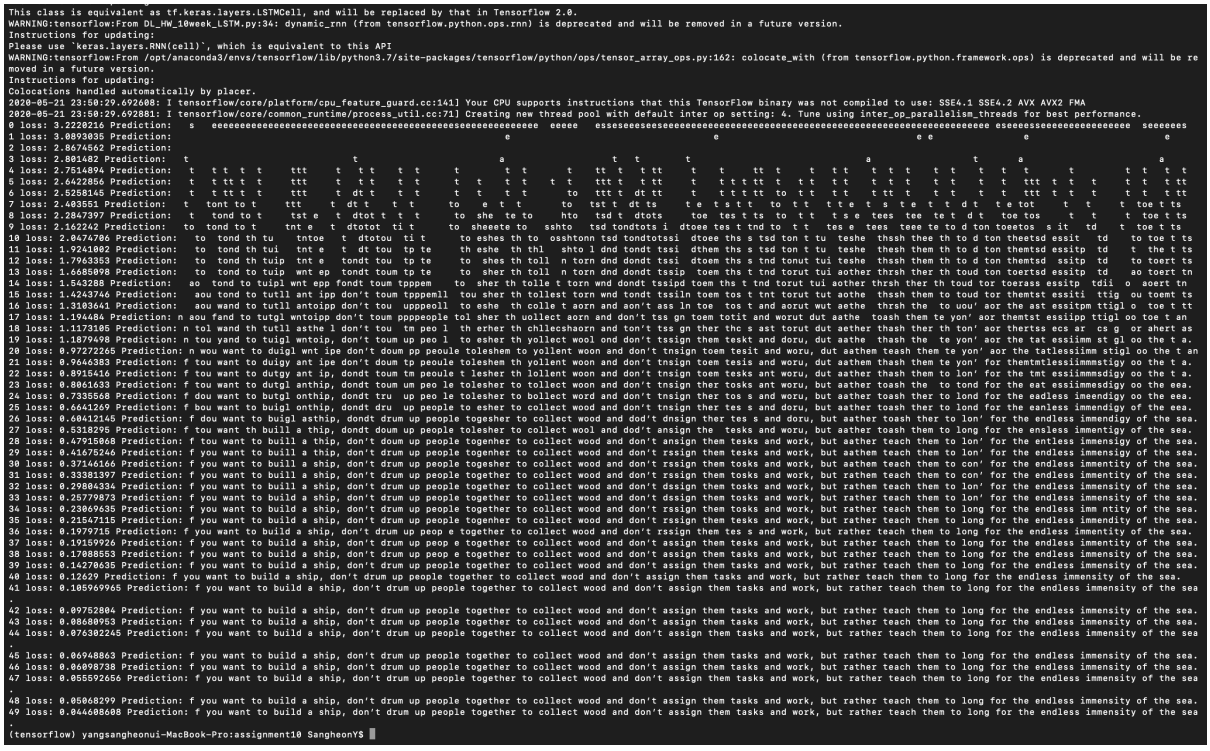
```
Instructions for updating:
Please use `keras.layers.RNN(cell)`, which is equivalent to this API
WARNING:tensorflow:From /opt/anaconda3/envs/tensorflow/lib/python3.7/site-packages/tensorflow/python/ops/tensor_array_ops.py:162: colocate_with (from tensorflow.python.framework.ops) is deprecated and will be re
moved in a future version.
Instructions for updating:
Colocations handled automatically by placer.
2020-05-21 23:40:11.826170: I tensorflow/core/platform/cpu_feature_guard.cc:141] Your CPU supports instructions that this TensorFlow binary was not compiled to use: SSE4.1 SSE4.2 AVX AVX2 FMA
2020-05-21 23:40:11.826440: I tensorflow/core/common_runtime/process_util.cc:71] Creating new thread pool with default inter op setting: 4. Tune using inter_op_parallelism_threads for best performance.
0 loss: 3.2577388 Prediction: motonotnsdhtontetkettotoetsettnetykottttostoenseetonkeyetktonttneeetytennttnettonetyknttknetaeostostkktnettoskkktotatosoetktoentetoeostonteneetotktaeotoydnotttneeeykkkttootaeotten
1 loss: 2.952802 Prediction: totototanootorootaotootottototottootttostotnoottotottototootootoottotottotttotottotttotottottan tototto sottantttotototototototootototto tototto tootottototo ttottoottto todttoroootototoon
2 loss: 2.618392 Prediction: tetanttantetartotaetantoepo tord tarotetostorn eetotd terotontotdetottord tn ttosdttantiinstoetetantetand tor  taotttosterotoetoeto tetortordetorotoetoodto sitnetastiaroo toettten
3 loss: 2.389074 Prediction:  etan tand tos  enetanteens tan ttao teto too de todn een tono ee ot to  tan  ao dtmnn ian tae etos iian  ao  tototetosoen tornteto  eto tend tor to  tod ersian tansiaro eto  ta n
4 loss: 2.2484207 Prediction:   ton tand to   etetonteees tond  t   eto     de to    eo to  o de   ton  and to d  tn eind  e etot  etnd to    to  toto   to nteto   to  e d to  toe tod e staoe od teto  toe te n
5 loss: 2.1092372 Prediction:   ton tond to do ne ant ers tond  a   eto t  dle to d  er to do d    tond and aond  ansiiedtoer tos’ tand aon   to  tos er to noeto   to dord to  toertod o stame od ietan toert  n
6 loss: 1.9068831 Prediction: m ton tan’ tondoipe anthers ton’  ar i to t  gle wo d her tondogd rh aond an’ aon’  ansiiedther tos’ tand aon   wo  tosher th nheto r tondond to  thertod ersiam  nd iatan thertted
7 loss: 1.739833 Prediction: m tan tan’ tandoipe antheps ton’  a  i wo a mgle wo d her thnlhglemh aon’ an’ aon’  ansiie ther tos’iiand aon   wuthtosher th sheta m to don’ to  themtod ersiim  ndiiatan themthed
8 loss: 1.6136023 Prediction: f ton tan’ tanloipe antheps ton’t ar  eto a mgle th l her thnlhglemh wong an’ won’t ansige ther thskiiand won s wuthtosher th sheth m to lon’ to  themtod ersiam  nsiiatan themth d
9 loss: 1.4803191 Prediction: f too won’ to luile antheps won’t ar  eth a o le thgether thnlhgle t wong and won’t ansige ther thssstand wor s wuthtosher th sheto m to le ’ tot themtod ersiam  nsitatar themth l
10 loss: 1.3450308 Prediction: f too wond to buile antheps bon t ar  eth a o le thgether thrlogle t worg and won’t ansige ther tossstand wor , wut eother th soeto m to be l tot themtod e siam  osithtar themth l
11 loss: 1.2161996 Prediction: f toomwond to buile anthepl bonlt ao m to aoogle together torbo lect worg and wonlt ansige ther tosss and wor , but eother to so toem do be d totlthemtodle s am  o ith ar toemte l
12 loss: 1.11458 Prediction: f toumtond tarbuile anshipl bonlt arum dp deogle together tarbollect eorg and won’t ansige ther tosss and wor , but euther ta soetae  do be d tot the todle s am  nsith ar themte l
13 loss: 1.0174487 Prediction: f tonmtond to builm anship, bon’t arum tp beo le tognther tarcollect eorg and don’t ansign ther tosks and wor , but tuthe  ta coethe  to be l tot the todle s am  nsith ar themteal
14 loss: 0.9158033 Prediction: f tonmwons to buile anshif, bon’t arum tp beodlecthgnther to collect doog asd don’t assignsther tosks and dor , but euther te coethe  to ce d tot the todless am ensith or the teal
15 loss: 0.8243876 Prediction: f toumwond to builg asshif, don’t arum up beodlecthg,ther th co lect doo’ asd don’t assign ther tosks and dor , but ruther to chethe  to le d tot the todlessiam endith ar the tea.
16 loss: 0.7441234 Prediction: f toumwand ta cuile anship, don’t arum up beodle thgether to co lect dord and don’t ansign ther tosks and dor , but rathe  to ch the  to cend tof the todlessiim endith or the tea.
17 loss: 0.6576703 Prediction: f youmwans ta cuile anfhip, don’t arum up peolle toget er ta collect doo’ and don’t ansign ther tosks and wor , but tather taesh tae  to cend fon themsadless immendity or themsea.
18 loss: 0.59517807 Prediction: f youmwant to cuile anfhip, don’t arum up peogle toget er to colle t woog ans don’t ansign them tosks and work, but rather toesh the  to lond fof the sodless immensity or themsea.
19 loss: 0.5342502 Prediction: f yoomwont to cugld asfhip, don’t arum uo peolle toget er th colle t woog and won’t assign them tosks and wor , but tather to ch the  to long fot the todless immensity or themsea.
20 loss: 0.48677257 Prediction: f youmtand to build anfhip, don’t arum wp pemple thgether te collect woog and won’t assign them tasks and wark, but rather  eech the  to long fot the eodlessiimmensity or themsea.
21 loss: 0.4561568 Prediction: f yontwont ta cuild anship, don’t arum tp peolle together to collect wool and won’t assign ther tasks and work, but rather te ch the  to long fot the eodless immensity or the sea.
22 loss: 0.37946984 Prediction: f yontwont to luild anship, don’t arum tp peogle tod ther te collect woog and won’t assign them tosks and work, but rather te ch the  to long fot the toslessiimmlnsity of the sea.
23 loss: 0.38130012 Prediction: f youtwant ta cuild anship, don’t arum tp perdle together to collect wood and don’t dcsign ther tasks ind dork, but rather to ch them to long for the eodlesseimmensity of themsea.
24 loss: 0.33814013 Prediction: f youtwant te cuild anship, don’t arum up people together to collect woop ans eon’t assign them tasks and dark, but rather  eash the  to long for the endlesseimmendity of themsea.
25 loss: 0.33499312 Prediction: f youtwant to build asship, don’t arum up people together to collect wood and won’t assign them tosks and work, but rather toach teem to long for the endlesseimmendity of themsea.
26 loss: 0.27476752 Prediction: f you’want to cuild a ship, don’t arum up people together to collect wood and won’t assign them tosks and woo , but tather toach them to long for the endless immensity of themsea.
27 loss: 0.28201246 Prediction: f you’wand te cuild a ship, don’t arum up peoplemtogether te colgect wood and don’t assign them tasks ind dork, but rather te ch teem uo long for the endlesseimmensity of the sea.
28 loss: 0.2847636 Prediction: f you’wand to build a ship, don’t arum up people together to bollect wood and don’t assign them tasks ind dork, but rather te ch them to long for the endlesseimmendity of the sea.
29 loss: 0.24162427 Prediction: f you want to build a ship, don’t arum dp people together to bolle t wood and don’t dssign them tesks and dork, but ruther to ch the  to long for the endless immensety of the sha.
30 loss: 0.23011123 Prediction: f you want to build anship, don’t arum dp people together to bollect wood and don’t dssign them tasks and dork, but ruther te ch the  to long for the endless immensity of the sea.
31 loss: 0.19453873 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of themsea.
32 loss: 0.16663365 Prediction: f you want to build a ship, don’t arum up people together to collect wood and won’t assipn them tasks and work, but rather toach them to long for the endless immensity of the sea.
33 loss: 0.15311171 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and work, but rather toach them to long for the endless immensity of the sea.
34 loss: 0.1452982 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
35 loss: 0.11925961 Prediction: f you want to build a ship, don’t drum up people together to collect wood and dou’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
36 loss: 0.10608529 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
37 loss: 0.09401268 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
38 loss: 0.08463919 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
39 loss: 0.08102198 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
40 loss: 0.07496237 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
41 loss: 0.06603155 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
42 loss: 0.05776029 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
43 loss: 0.053754017 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
44 loss: 0.04779509 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
45 loss: 0.043198045 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
46 loss: 0.037707817 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
47 loss: 0.034444004 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
48 loss: 0.031561237 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
49 loss: 0.029950378 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
(tensorflow) yangsangheonui-MacBook-Pro:assignment10 SangheonY$
```

- Maximum Loss & Wrong Sentence (Worst Result):

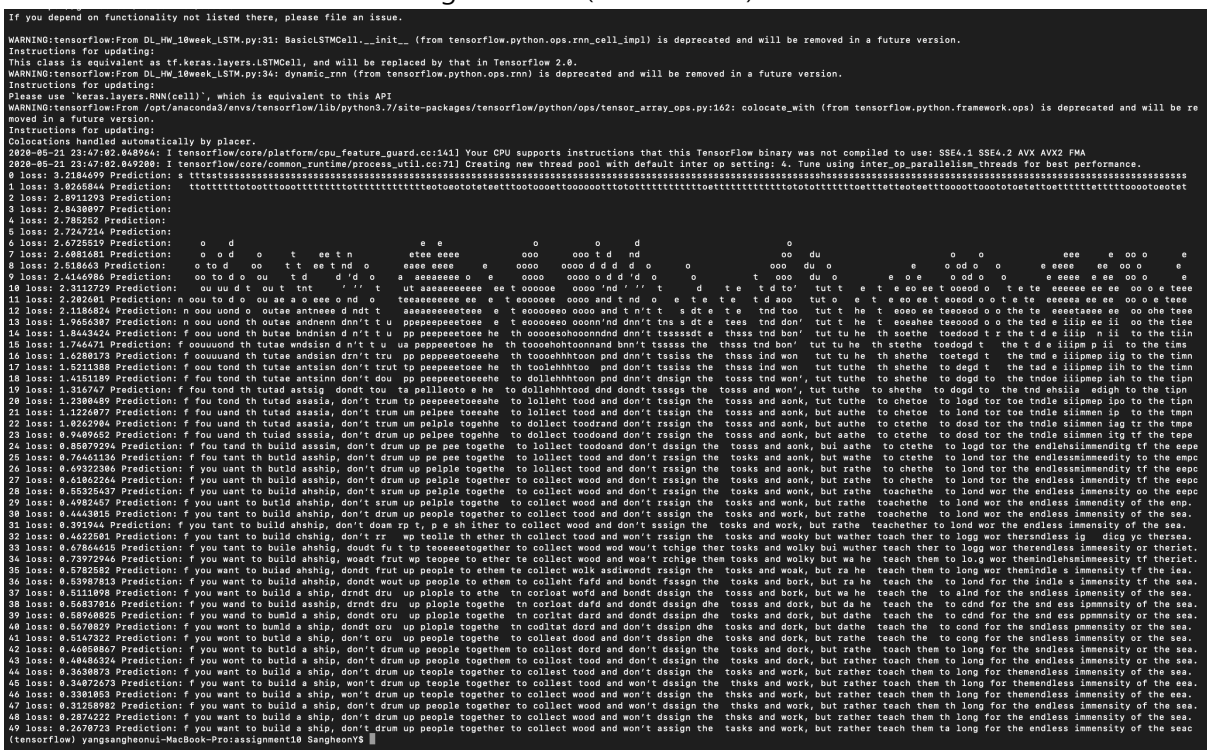
```
If you depend on functionality not listed there, please file an issue.

WARNING:tensorflow:From DL_HW_10week_basicRNN.py:30: BasicRNNCell.__init__ (from tensorflow.python.ops.rnn_cell_impl) is deprecated and will be removed in a future version.
Instructions for updating:
This class is equivalent as tf.keras.layers.SimpleRNNCell, and will be replaced by that in Tensorflow 2.0.
WARNING:tensorflow:From DL_HW_10week_basicRNN.py:34: dynamic_rnn (from tensorflow.python.ops.rnn) is deprecated and will be removed in a future version.
Instructions for updating:
Please use `keras.layers.RNN(cell)`, which is equivalent to this API
WARNING:tensorflow:From /opt/anaconda3/envs/tensorflow/lib/python3.7/site-packages/tensorflow/python/ops/tensor_array_ops.py:162: colocate_with (from tensorflow.python.framework.ops) is deprecated and will be re
moved in a future version.
Instructions for updating:
Colocations handled automatically by placer.
2020-05-21 23:42:26.420180: I tensorflow/core/platform/cpu_feature_guard.cc:141] Your CPU supports instructions that this TensorFlow binary was not compiled to use: SSE4.1 SSE4.2 AVX AVX2 FMA
2020-05-21 23:42:26.420550: I tensorflow/core/common_runtime/process_util.cc:71] Creating new thread pool with default inter op setting: 4. Tune using inter_op_parallelism_threads for best performance.
0 loss: 3.1953588 Prediction: taantiaaasywhstaibyataaiamhaaantahtanwaaa.aaattetta eaheaata ta eetahta e tat t tttataiyyasayymmah.i.yaasawas waaaiywanhiaathynseaaeaaahsta taaa  taeatan attyaymmnsyy..ssaahymayy.
1 loss: 2.9410014 Prediction: tttttetttototetttttetttttteeetttttttttttttttttttttttetttttettetttttttteetttttttttttttttttttttttttttteetttettttttttttttttttttteettttetttttttetteettttttttttttttttttttetttttttttttttetttttetttttttetttttt
2 loss: 2.8060484 Prediction:   to eee to eeeoe e oooeeee o  eo    ee ee ee ee eo e eeeeto eo eeeeeee e  oo    to eoei eeoheeeto eoe eeo o ee  eee  eoe eto eoeeeeeeto eeeee    eoeee   e ei  ee ti eeto  eeeee
3 loss: 2.616412 Prediction:   to   o to o  oi e to ie e o   o            o   o   oe  to  o e  oo o    oo     o   ii   ohe  to osi   o o  s   oh  soe  to  oe he   o  o  o     oe       oi     oi h to  oe  i
4 loss: 2.4417043 Prediction:    o     to o  o     osie                      o   he   o  o e  oh o     s         ii   she   o isi     o  s  ui   she  to  o  he   o     o     oe       si     di h to  he  i
5 loss: 2.3011498 Prediction:   to  t nto o  u  e  osii e    ’th              to e he  to to e  ohso     s   n th ssi m the   o isi  d  o  s  u    she  to  o  he   o  o ’o    the       si     difh    she  s
6 loss: 2.1412513 Prediction:   ton tonto o  u  e  sssime   ndthd nm          to e he  th to e  o tonm   t n ndthdssi e  hem  h ssi  d uo  s euo   nhe nth co themm h to ’o o  themn d n si pemndifh    them s n
7 loss: 2.00311 Prediction: poton tanto o du le n ssime   ndt d um ad ae ne  top’the nthnto e  o tonm tnd n ndthdssifedthem no ssi nd uo ms euo mnthe nthnco themmth ’o ’otof themn d e si pemndife  n themds n
8 loss: 1.8771653 Prediction:  otof’tando o buile tntsime w ndt d um ad ae nme to ethe ntopdo e to tonm tnd s ndt dssiledthem no ssi nd to es euo n she nto co themmto do ’otof the d d e siipemndife tf the ds n
9 loss: 1.7330798 Prediction:  oton iand  o tu le t shim, t ndt d up apiae  le to dther to do eeto wonm tnd u ndt dssilndthem to ksi nd fo ls bus mnthe nto co themmto do ’otof the dot e i  pemndife tf the ds n
10 loss: 1.6135086 Prediction:  otof iand  o tu le t shim, t ndt d  p  p ae  le to dther to to eech wond tnd fon’t dnsilndthen to ksi nd fo l, but pnther to co ther to do ’ttof thertod e s ipm ndife sf toerto n
11 loss: 1.4825749 Prediction:  otou tand to bu le t thip, b n’t b  g ud ae  le to ether to to eect wond tnd uon’t bnsilntthen to ks  nd to l, but p ther to co ther to te ’tto  toe tod ecs ip  ndife tf toe b  n
12 loss: 1.3658975 Prediction:  otoultant to bu le tnthip, b n’t b  g ud pe nle to ether to to eect wond tnd uon’t bnsign then to ks  nd to l, bu  p ther to ch ther to te ’nto  toe t d ets ipm ctige of toe t  u
13 loss: 1.270849 Prediction:   ton want to bu le tnship, d n’t d  p tp pe ule tonether to to leco bond tnd uon’t dtsign then tonks  nt tonl, bu  pnther tonco them to le ’ tor toera d ecs ium ndigh tf toera  .
14 loss: 1.1754119 Prediction:   ton tant to bu le anship, d n’t d up tp peoule toaether to bo lech wond and uon’t dtsiintthem tonks ant tonl, bu  p ther tonch them to le ’ tor t e aod ecs ipm ndign of toera  .
15 loss: 1.0870507 Prediction:   tonltant to butle anship, don’t a um tp peonle toaether toaco lech wond and ton’t ansign them tosks and tonl, bus pnther toach them to le ’ top toeraod ecshipm ndify of toera a.
16 loss: 0.9802334 Prediction: g tongtant to buige anwhip, don’t a um  p peonle topether torco lech wond and ton’t ansign them tosks and tonl, bus pether toach them to ler’ top the aod ecs imm ndifn of toe ahac
17 loss: 0.8983827 Prediction: l ton tant to build anwhim, don’t a um  p peonle toaether th co lect wond and don’t assign them tosks and tonl, bus pether toach them to le g tor the a d e s ipe cdifn of the a a.
18 loss: 0.82235074 Prediction: l ton tant to build anwhim, don’t d um tp peonle to etoe  to do lect whrd and don’t dssign them tosks and donl, bus pether teach them to le g fof the ard d s imm dsife of the a a.
19 loss: 0.77079546 Prediction: l ton tant to build anshim, don’t a um tp peonle to ether teaco lect whrd and don’t assign them tesks and wo l, but pether thach them toale g tor the ard ecs imm dsify of the aea.
20 loss: 0.7025459 Prediction: l ton tant to build aswhim, d n’t d um up peonle toaetyer te co lect wond and won’t dssign them tosks and wonk, but pesher teach them to lerg tor the ard dts imm nsify of themteac
21 loss: 0.65394187 Prediction: l ton tant to build anssip, don’t doum up peonle to ether to co lect word and don’t dssign them tosks and work, bus pasher thach teem to ldrg tor theraodldts immensify of thertea.
22 loss: 0.57925636 Prediction: l ton want to bu ld anssip, don’t aoum up peonle toaether thaco lect wood and don’t assign them tosks and wor , bus pather thach them to le g tor the aodless immensify of theraea.
23 loss: 0.5601687 Prediction: f ton want to butld anship, don’t d um up peoule to ether to dollect wopd and don’t assign them tosks and wonk, but pathe  te ch them to lo g for the aodless  mmensify of the aea.
24 loss: 0.50229543 Prediction: f you wantlto build aswhim, don’t d ug up peoulerto ether to collect wood and don’t dssign them tosks andlwonk, but pather toach them to long for the aodless immensify of the sea.
25 loss: 0.48549122 Prediction: f tou want  o bu ld wlwhim, don’t a um up peoule to ether th co lect wood and don’t assign them tosks and wonk, but pather thach them to lo g for the andless immensity of theraea.
26 loss: 0.43456617 Prediction: f tou want  o build anship, don’t d um up peoule together te co lect wood and don’t assign them tosks and work, but pather teach them to long for the tnd ess immensity of thertea.
27 loss: 0.3832659 Prediction: f tou want to build anship, don’t d um up people together to co leco wood and don’t dssign them tosks and dork, but pather tea.h them to ldng for the tnd ess immensity of themtea.
28 loss: 0.36035934 Prediction: f tou want to build anship, don’t d um up reople together to collect wood and don’t dssign them tosks and work, but rather tea.h them to lo g for the and ess immensity of theraea.
29 loss: 0.33184838 Prediction: f tou want to buile a ship, don’t d um up reople together to collect wood and don’t dssign them tesks and work, bui rather teach them to lof’ for the and ess immensity of yhersea.
30 loss: 0.31790903 Prediction: f you want to build anship, don’t a um up people together to collect wood and don’t assign them tosks and work, but rather thach them to le g tor the and ess immensity of the sea.
31 loss: 0.28761423 Prediction: f you want torbuild asship, don’t a um up people together to collect wood and don’t assign them tosks and work, but rather teach them to long tor the sndless immensity of thems a.
32 loss: 0.25838196 Prediction: f you want to build a ship, don’t a um up people together to lollect wood and don’t assign them tosks and work, but rather teash them to long tor the snd ess immensity of thems a.
33 loss: 0.23950708 Prediction: f you want to build a ship, don’t a um up people together to collect wood and don’t assign them tosks and work, but rather teach them to long for the andless immensity of the sea.
34 loss: 0.21281141 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tosks and work, but rather teach them to long for the andless immensity of the sea.
35 loss: 0.18897745 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tosks and work, but rather teach them to long for the endless immensity of the sea.
36 loss: 0.17127396 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tosks and work, but rather teach them to long for the endless immensity of the sea.
37 loss: 0.1619291 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
38 loss: 0.15325765 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the erdless immensity of the sea.
39 loss: 0.14402312 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the erdless immensity of the sea.
40 loss: 0.12243539 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
41 loss: 0.11495851 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tosks and work, but rather teach them to long for the endless immensity of the sea.
42 loss: 0.10287455 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
43 loss: 0.08872318 Prediction: f you want to build a ship, don’t drum up people together to collect wood and won’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
44 loss: 0.08808451 Prediction: f you want to build a ship, don’t drum up people together to lollect wood ant dod’t assign them tasks and work, but rather teach them ta long for the endless immensity of the sea.
45 loss: 0.13566579 Prediction: f you want to build a ship, don’t drum up peoplertogetherufoncollect word and don’t dssign them tasks and work, but rather toach them ta co gsfor the end esssimmensity of the sea.
46 loss: 0.21194054 Prediction: f you want to build a ship, dondt a pm up people thgether to collect wood and don’t assign them tasks and work, bui rather teach them ta cong for the eodless ym ensity af the sea.
47 loss: 0.1743446 Prediction: f you want to build anship, don’t arum tpe eanee thgethem to dollect word and don’t ass gn them ta k, and dork, bui rather teach them uo le g for the end e ,  pm nsity of themtea.
48 loss: 0.46414542 Prediction: f you tantltoreuile snthipe don’t arum up people tog ther to collect wtrd wso don’t dssign them notks andlwor w euihrather tha.h them notlan’ for therendless immentity of the tea.
49 loss: 0.56383395 Prediction: f tou waot  p cutld anship, don’t bouf np pesplebtog ther toolollect wood snd won’t bshign ther nhsks andlwon w buthrathir thach ther notlen’ for therendless iumenoity of the tea.
(tensorflow) yangsangheonui-MacBook-Pro:assignment10 SangheonY$
```

➢ LSTM(*DL_HW_10week_LSTM.py*) 실행결과

- Minimum Loss & Correct Sentence (Best Result):



- Maximum Loss & Wrong Sentence (Worst Result):



➢ GRU(*DL_HW_10week_GRU.py*) 실행결과

- Minimum Loss & Correct Sentence (Best Result):

```
Instructions for updating:
Colocations handled automatically by placer.
2020-05-21 23:56:14.034048: I tensorflow/core/platform/cpu_feature_guard.cc:141] Your CPU supports instructions that this TensorFlow binary was not compiled to use: SSE4.1 SSE4.2 AVX AVX2 FMA
2020-05-21 23:56:14.034284: I tensorflow/core/common_runtime/process_util.cc:71] Creating new thread pool with default inter op setting: 4. Tune using inter_op_parallelism_threads for best performance.
0 loss: 3.234751 Prediction: nnnntnnnnn n tnnnnnnnnnnnnnnnnnnnntnnnnnnnnnnnnnnnnnnnnnttnttttntnnnnnnnnnnnnnnnnnnnnnnnnnnntntnnnnnnnttttnn nnnnnnnnnnnnnnnnnnnnnnnnnnn tnnnn ennn tnnnttnnnnnt nnnttnnnnnnnnntttttttnnt nnnnn
1 loss: 3.1236591 Prediction: t         hhhhttttttthhhhheee   t h t    eeeeeeeeeeehhhhhhhhhhteeeehhetttttt     t hhhhththhhhhhhhhhhhh t  tt  t hhhhhhhhhhhhhhhhhhhhhhhheetth tthhhhhhhtthhhhttttththhht hhhhhhhh
2 loss: 2.9084468 Prediction: t                                          e   e   e    e                                         e       e  e                 e                        e
3 loss: 2.723485 Prediction: n                           ooo           ooo oo                   oo                                         e
4 loss: 2.6606631 Prediction: n       n      n     nn     ooo           oee eeeee    e   e  e ee  eooon  n         n  n    e   en    n         s      e   e n eeee   e  en        e          n             e    n
5 loss: 2.521428 Prediction: n       n      s n   nnn n  ooo           oeeleeeeeee ee  eeeee ee eeeoln  n        sssn    e   es    n    u    u      e  ee n eeee  eeeeen       ee e   n    n     n       e ee n
6 loss: 2.3690867 Prediction: n t   t n     tu n    nniin  oou t      a ooerleeeee e ee  te lelee teeoll tn    u   assini   e  tesss in   ’’   auu   s e  te steeee  te lel  t   tee el  e  iin    in  tn   e ts s
7 loss: 2.204662 Prediction: n t   t n  terlu t  tntiin  ooo t or   treoerleelte e ee  te leleest toll tn  o u   assinist e  tesss in  oo’   buu r s e  te stetee  te lel  t   teerelt e siin  s in  tn teeree s
8 loss: 2.038089 Prediction: n t   t nt t  tu tn tniiino oon   t    t eoerlee te e he  te llleest t nn tnd t n   tssiiist e  thsisiins ton   tu  a she  te stethe  th ten  t   t e tlt e iiin  s in  tn teertess
9 loss: 1.8818774 Prediction: n tou t nt torputun tndiinoooop’t aou  t eoeolee te e he  te llleest toln tnd ton’t assinisthe  tesss tnd to’   but a the  te stethe  th telt t   the tlt e siig  s  fh tl toertess
10 loss: 1.6955184 Prediction: n tou tont aorputun tndief,opop’t aou  tpepeolee tooe he  to loleest tool tnd ton’t assigi ther tosss and won , but a the  te ctethe  to leng to  the tlt emsitg  m  fo pp toertess
11 loss: 1.5634252 Prediction: d tou t nt torbutun tndiif, don’t a u  tpepeplee tooe he  to looeest toon tnd ton’t assifn ther tosss and ton , tut a the  te ctethem to leng to  the tot essiig  m  fh tn toertees
12 loss: 1.4142383 Prediction: f tou t nt to butun tnd ef, bon’t a u  bpepe lee to emhe  to looeest toon tnd ton’t assifn them tosss tnd ton , but a she  th ctethem to leng to  the tnt essiig  m  fh tn toeste s
13 loss: 1.2693862 Prediction: f tou uant torbutut ans ef, bon’t aru  bpepe lee to emher to loleent toon dnd ton’t assifn them thsss tnd don , but r the  th ctethem to leng to  the cnd essiig  ms fh dn thesae s
14 loss: 1.1326375 Prediction: f tou uant torbutut ansiin, don’t aru  upepeppee to emher to loleect toon and ton’t assifn ther thsis and don,, but r ther th ctether to llng tor the cpdoessiig ins f  df r erae s
15 loss: 1.0027854 Prediction: f tou aant to butfd tnsiif, don’t aru  ur peppee tooe her to loleect toon and don’t assifn ther thsis and don,, but r ther th ct the  to leng tor the cpdoessiig ins f  dn therseac
16 loss: 0.87393135 Prediction: f tou aant to butfd tnsiip, don’t aru  upopeolle to e her to loleect wool and don’t assifn them tesis and don,, but r ther te ct the  to lolg tor the cndoess ig ens f  dn themseac
17 loss: 0.760983 Prediction: f tou aant to buifd tnsiip, don’t aru  upopeolle to e her to loleect wood and don’t assigndthem tesis and donk, but r ther teact the  to long tor the end ess ig ens f  df themsea.
18 loss: 0.6561601 Prediction: f toumbant torbuifd ansiip, don’t arum upopeeple to e her to loleect wood and don’t assign them tasks and wook, but rather teact the  to long tor the endoecs ig ensit  df themsea.
19 loss: 0.5718614 Prediction: f you aant to butld assiip, don’t arum up peaple to ether to collect wood and don’t assign them tasks and work, but rather teach them to long for the ens ess ig ensity df themsea.
20 loss: 0.50829583 Prediction: f youmaant to build assiip, don’t drum up people tolether to coleect wool and don’t dssigntthem tasks and wook, but rather teach ther tolceno tor tae endless im ensity df the sea.
21 loss: 0.4955549 Prediction: f you bant to butld ansiip, don’t drum up people tolether to lollect wood and don’t assign them tasks and wook, but rathe  to ch ther tollelg for the eodless im ensity df the sea.
22 loss: 0.406025 Prediction: f you aant to build a siip, don’t drum up peaple together th eollect wood and don’t dssign them tas s and wook, but rather thathethem to long for the bndless im ensity of the sea.
23 loss: 0.36057895 Prediction: f you want to build anship, don’t arum up peaple together to lo lect wood and don’t asssgn them thsks and dork, but rathe  to ch them th long for tae endless immensity of the sea.
24 loss: 0.395305 Prediction: f you tant th au ld a shep, don’t arum up peaple together to collect wood and don’t assign the  tasks and donk, but rathe  teach the  to long fo  the endless immensity of the sea.
25 loss: 0.33976138 Prediction: f youmu nt ao build a sh p, don’t drum up peaple together to collect wood ond don’t rssigntdaem tasks and dook, but rather teach the  to leng fo  the endless immensigy of the eea.
26 loss: 0.40429297 Prediction: f t umuant do build a th p, don’t drum up peaple together to collect wood bnd don’t dnsign the  tes s add wook, but rather teach ther to long for toe endless immensity of the sea.
27 loss: 0.3550024 Prediction: f t u want to build a siip, don’t drum up peaple together to collect wood and wrn’t ddsign them tasks and took, but rather teach ther to long for the endless immensity of the sea.
28 loss: 0.31169176 Prediction: f tou want to build a ship, don’t drum up peaple together to collect wood and wrn’t ddsign them tasks and work, but rather teach them to long for the endlessiimmensity of the sea.
29 loss: 0.25759867 Prediction: f wou wwnthto build a ship, don’t drum up people together to collect wood and don’t ansign them tasks and work, but rather teach them to long for the endlessiimmensity of themsea.
30 loss: 0.21561734 Prediction: f you want to buill a ship, don’t drum up people together to collect wood and don’t ansign them thsks and dork, but rather teach them to long for the endless immensity of themsea.
31 loss: 0.20548022 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and dork, but rather teach them to long for the endless immensity of themsea.
32 loss: 0.17871818 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and dork, but rather teach them to long for the endless immensity of themsea.
33 loss: 0.15110853 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and york, but rather teach them to long for the endless immensity of themsea.
34 loss: 0.13077897 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and york, but rather teach them to long for the endless immensity of the sea.
35 loss: 0.11563088 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
36 loss: 0.10079642 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
37 loss: 0.086117886 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
38 loss: 0.079168856 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
39 loss: 0.0714876 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
40 loss: 0.058886692 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
41 loss: 0.050068762 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
42 loss: 0.04361905 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
43 loss: 0.039759345 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
44 loss: 0.034477785 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
45 loss: 0.031265672 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
46 loss: 0.027467638 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
47 loss: 0.024611037 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
48 loss: 0.022367235 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea
.
49 loss: 0.01998396 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, but rather teach them to long for the endless immensity of the sea.
(tensorflow) yangsangheonui-MacBook-Pro:assignment10 SangheonY$
```

- Maximum Loss & Wrong Sentence (Worst Result):

```
If you depend on functionality not listed there, please file an issue.

WARNING:tensorflow:From DL_HW_10week_GRU.py:32: GRUCell.__init__ (from tensorflow.python.ops.rnn_cell_impl) is deprecated and will be removed in a future version.
Instructions for updating:
This class is equivalent as tf.keras.layers.GRUCell, and will be replaced by that in Tensorflow 2.0.
WARNING:tensorflow:From DL_HW_10week_GRU.py:34: dynamic_rnn (from tensorflow.python.ops.rnn) is deprecated and will be removed in a future version.
Instructions for updating:
Please use `keras.layers.RNN(cell)`, which is equivalent to this API
WARNING:tensorflow:From /opt/anaconda3/envs/tensorflow/lib/python3.7/site-packages/tensorflow/python/ops/tensor_array_ops.py:162: colocate_with (from tensorflow.python.framework.ops) is deprecated and will be re
moved in a future version.
Instructions for updating:
Colocations handled automatically by placer.
2020-05-21 23:55:53.303036: I tensorflow/core/platform/cpu_feature_guard.cc:141] Your CPU supports instructions that this TensorFlow binary was not compiled to use: SSE4.1 SSE4.2 AVX AVX2 FMA
2020-05-21 23:55:53.303281: I tensorflow/core/common_runtime/process_util.cc:71] Creating new thread pool with default inter op setting: 4. Tune using inter_op_parallelism_threads for best performance.
0 loss: 3.21802 Prediction:
1 loss: 2.9318137 Prediction:
2 loss: 3.0118854 Prediction:        ae eee e   h eee e eeeeee ee      eeeeeeeeeeee ee  eeee eee   e     ee        e t eeeee   eeea aee     aaaaahaaeee  ee e eeee   eeeeeeeeeeeeee e   e          h    eee    e
3 loss: 2.8694212 Prediction: n e e eeeneeeee   eeeeene eeeeeetee e  e eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee een e enteeennnnneeeeeeeen   nddeeee ee  eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee eennnn   nnne eeeeeeeentn
4 loss: 2.7634966 Prediction: nooo   ondooooo   eooddneneeeoedteoo   o eeeoeeeoeoeeooeoeeoeooeeeoooooo ooddd o dteodnnneneoeoeeodn   ddddo   oot oooneeoeeooneeeoeo eoeoeedeeoeeeeoeoeod eonntnn  dnnoooeoooeoentn
5 loss: 2.6897764 Prediction: nooo   ondooo o   oooddie oooo ttooo   o ooeotoeoooooooeo toooo eeooooo oodd  o ttoodiinedtoeo todn  tnddoo t oot oootoeo toonoeooeo toooe deoo oooeootdoeoiitn  otinooo oooeooitn
6 loss: 2.5875363 Prediction: nooo   otdo o t   eo dsis ooto ttoto   t otootoetto otoet to to eetoooo    ns    ttotdsiitttoet tosi   ns  o    tu oo toet toon etoet to te teto  toett s s iit    tiiooo o oet i n
7 loss: 2.4497006 Prediction:   to u otto o tu  e  ssss o t  tt t      otot oetto etoe  to to ee  oto    ns    tt tssii ttoe  tosi   ss  o    tu  t toe  to s etoe  to te teto  toe   s s  i     sii      oe  i n
8 loss: 2.3074203 Prediction:   to u otsh h tu  e  ssss   t  tt t    t  tot oe th ethe  th to ee  hto    ss    st tsssi sthe  ths    ss  o    tuu t the  th s ethe  th te set   toe   s s  i     sii     the  i s
9 loss: 2.1728265 Prediction:   touu onshth tu  e tssss ,    ttht    t ptpople th ethe  th to ee  hto    ss    sthtssig sthe  thsi  tss  o    tuu t the  th shethe  th te set   the   s e iiti   sig     the  i s
10 loss: 2.0295358 Prediction:   touu onthth tuu s tssisg,,   dth     t ppeople th ethe  th to ee  hto   tss t  sth ssiinsthe  thsi  tss to    tuu t the  th shethe  th te ’eto  the   s esiiti   sig     the  i n
11 loss: 1.8825724 Prediction:   touutonthth tuu d tnsisg,,  udtha    t ppeople to ethe  to to ee  htoo  tns t  ’thasiiindthe ethsi  tns to    tuu t nhe  to shethe eto te ’eto  toe t s esiiti   dig  a  the  inn
12 loss: 1.744862 Prediction:   touutont to tu id tntisg, tondt a    t ppeople to e her to to ees  toon tns tondt asiiindtoe ethsi  tns too   tuu t nher to shethe eto te deto  toer rs esiiti  ndig  a  toea inn
13 loss: 1.5992765 Prediction: n touutont to tu pd tnt ep, tondt ao   tpppeople to e her to tonees  toon tns tondt ansiindtoea ths   tns too , tut tonher to chethea th tondeto  toer rs esiitg  ndiphoau toea smn
14 loss: 1.4829742 Prediction: p aouu ont to butid ans sp, tondt ao m lp people to e her to bonees  toon ans tondt ansiin’them thss  and tor , but aonher to chhthem th bon’eton toem ss esiiiii ndii  an ahem sm.
15 loss: 1.3626814 Prediction: p aouu ont to butpd tns ep, tondt aotm pp people to ether to tolles  toon and tondt ansiin them tot , and tor , but tother to ch them to tond ton toemend essiii  ndip  of ahemesm.
16 loss: 1.2441425 Prediction: f aou  ont to butpd tnssep, tondt aotm pp people th ether to tolles  toas and tondt ansiin them toth  and tor , but aother to ch them to bondeto  toemend essiii  ndit  of ahemesm.
17 loss: 1.1425462 Prediction: f aou  ont to dut d assssp, tondt aotm pp people th ether to doulest toas and aondt assiin them thss  and tork, but aother to ch them th dondeto  toemend essiii  ndit  of ahemesm.
18 loss: 1.0444009 Prediction: f aou  ont to duuld tnsssp, tondt aotm pp people th ether to tollest tors and aondt ansiin them thss  and tork, but tother torch them th dond to  toemend essiii  mdit  of them sm.
19 loss: 0.9455644 Prediction: f lou  ont to duild ass  t, bon’t artm pp people th ether to lolle   tors and aon’t ansiin them thss, and work, but aother torch them to don’ttor toemend essiii emdit  of them s .
20 loss: 0.8546308 Prediction: f you wont to duild asssip, bon’t artm pp people th ether to doule t torg and don’t ansign them tossh and tork, but aother torch them to don’ttor toerend essiig endit  of themss .
21 loss: 0.7684778 Prediction: f you want to duild arssip, bon’t artm pp people th ether to lolle t torg and don’t ansign them toss,  nd tork, but aother torch ther to don’ tor there d essiiimendity ou them   .
22 loss: 0.70750964 Prediction: fyyou want to duild asship, bon’t artm pp people thgether to coule t torg and don’t ansign them tassh and bork, but aather totch the  ta don’tfor themsnd essiiimendity of themss .
23 loss: 0.66306067 Prediction: fyyou want to duild aosh p, bon’t arum up people thgether to colle t toog and don’t ansign them tashh and work, but eother torch them to don’tfor themend ess ig endity ou themss .
24 loss: 0.5813524 Prediction: f you wont to butfd toehip, bon’t arum up people to ether to colle t toog and don’t ansignmthem tosk, and work, but eather torch the  to lon’etor therend ess ii endity ou thereea.
25 loss: 0.59377664 Prediction: f you want wo butld dsskip, don’t a um up people thgether te colle t tood and don’t aniign them task, and boru, but aather teach them ta don’ for themend essiiimensity of thens a.
26 loss: 0.53576255 Prediction: f you want wo dutld ass ef, don’t a um up people th ether th colle t tood and don’t ansignethem tosks and boru, but aather thoch eher to don’ for therens ess igmendity of the sea.
27 loss: 0.5409249 Prediction: f you want wo duild asshii, don’t drum ui people togethe  to dollect tood and don’t dnsign toem tasks and dork, dut tather totch then togdon’ for themsnd essiiimensity of thems a.
28 loss: 0.50740445 Prediction: f you want to duild a ship, don’t arum up people to ethe  to collect tood and don’t asskgn toem tosks and work, dut tathe  totch them to don’ for themsnd ess ipmensity of themsea.
29 loss: 0.43295744 Prediction: f you want to cuild arship, don’t arum up people to ether to collect tood and won’t asshgn toem tosks and work, but rather totch toem to don’ for therend ess ipmensity of themsea.
30 loss: 0.4054 Prediction: f yof want to cuild asship, don’t arum up people together te collemt tood and won’t anskgn them tosks and work, but rather tetch them to long for therens ess iimensity of thereea.
31 loss: 0.36889693 Prediction: f yof want to luild a ship, bon’t arum up people thgether te collect tood and don’t anskgn them tosks and work, but rather teach them to gong for therend ess iimensity of thereea.
32 loss: 0.35520896 Prediction: f you want to wuild a ship, bon’t drum up people to ether to collect tood and don’t ansign them tosks and work, but rather teach them to gon’ for therendless immensity of themsea.
33 loss: 0.30169445 Prediction: f you want to build a ship, bon’t drum up people to ether to collect wood and don’t dssign them tosks and work, but rather toach them to lon’ for the sndless immensity of themsea.
34 loss: 0.2631458 Prediction: f you want to build a ship, bon’t drum up people to ether to collect wood and don’t dssign them tosks and work, but rather toach them to lon’ for therendless immensity of the sea.
35 loss: 0.23685437 Prediction: f you want to build a ship, bon’t drum up people together to collect wood and don’t assign them tasks and work, but tather toach them to lon’ for the sndlessiimmensity of the sea.
36 loss: 0.21079558 Prediction: f you want to build a ship, bon’t drum up people together to collect wood and don’t assign them tasks and work, but rathe  teach them ta long for therendlessiimmensity of the sea.
37 loss: 0.1938407 Prediction: f you want to build a ship, don’t arum up people together to collect wood and don’t assign them tasks and work, but rather teach the  to long for therendlessiimmensity of the sea.
38 loss: 0.18011063 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, dut rather toach them to long for the sndlessiimmensity of the sea.
39 loss: 0.1686171 Prediction: f you want to build a ship, don’t drum up people together to collect wood and don’t assign them tasks and work, dut rather teach them to long for therendlessiimmensity of the sea.
40 loss: 0.13800666 Prediction: f you want to build a ship, dor’t drum up people together te collect wood and don’t assign them tasks and work, dut rather teach them to long for therendless immensity of the sea.
41 loss: 0.16914204 Prediction: f you want wo c nld thship, don’t arum up people together to collect wood and don’t assign them tosks and work, but rather teach them to londefor therend ess ammensity of the sea.
42 loss: 0.2682999 Prediction: f you want wo c pld thship, don’t arum up people together to collect word and don’t assign toem tasks and work, but rather toach them to long for therend ess immensity ol the sea.
43 loss: 0.2522182 Prediction: f you want wo bupld toship, don’t drum up people together to collect word andlaon’t assimn them tasks and work, but rather toach them ta long for the endless iimmmiifyoou toems m.
44 loss: 0.47912443 Prediction: f you want wo build t ship, don’t drum up people togethe  to bollect aord andlarngt assign them tasks and donk, but oather toach them ta long for themsndlessiimmensigy ol thems m.
45 loss: 0.33860496 Prediction: f you want to du ld a ship, don’t drum up people together to dollect aord and don’t ansign them tasks and donk, dut rather toach them ta long for therendless immendigy of the sea.
46 loss: 0.26034376 Prediction: f you want to tu ld a ship, don’t drum up people to ether te tollect aood and tor’t anskgn them tasks and uor , but aother teafh rhe  to long for there dless immendity of the eea.
47 loss: 0.40672398 Prediction: f you want to build a ship, don’t drum up people together to bollec  tood dnd don’t anskgn them tasks and tor , but rather toach the eto long for therendless amm ndity of the sea.
48 loss: 0.2604717 Prediction: f you want to build anshii, don’t drum up people togethe  to collec  woon asd don’t asskgn them tasks and tork, but rather toach them to long for the endless amm ndity of themsea.
49 loss: 0.26855433 Prediction: f you want to build t ship, don’t drum up people togethe  to collect woon asd don’t assign toem tasks and work, but r ther toach them to long for the endless imm ndity of themsea.
(tensorflow) yangsangheonui-MacBook-Pro:assignment10 SangheonY$
```

3. Disscussion:

< 코드 설명 >

```
sample = "if you want to build a ship, don't drum up people together to collect wood and don't
    assign them tasks and work, but rather teach them to long for the endless immensity of the sea."
idx2char = list(set(sample))  #index -> char
char2idx = {c: i for i, c in enumerate(idx2char)} #char -> index

#hyper Parameters
dic_size = len(char2idx) #RNN input size (one hot size)
hidden_size = 15 #RNN output size
num_classes = len(char2idx) #final output size (RNN or softmax, etc)
batch_size = 1  #one simple data, one batch
sequence_length = len(sample) - 1 #number of lstm rollings( unit #)
learning_rate = 0.1
epoch = 50
```

```
#====================HW====================#

X = tf.placeholder(tf.int32, [None, sequence_length])
Y = tf.placeholder(tf.int32, [None, sequence_length])

X_one_hot = tf.one_hot(X, num_classes)

#cell = tf.contrib.rnn.BasicRNNCell(num_units = hidden_size)
cell = tf.contrib.rnn.BasicLSTMCell(num_units = hidden_size)
#cell = tf.contrib.rnn.GRUCell(num_units = hidden_size)

outputs, _state = tf.nn.dynamic_rnn(cell, X_one_hot , dtype = tf.float32)

#==============================================#
```

소스코드의 전체적인 구조는 9주차 과제의 구조와 같다. 다른 점은 Sample Sentence가 훨씬더 길어진 점과, hidden_size를 15로 고정하여 사용한 점, 그리고 3종류의 RNN 모델을 각각 따로 사용한 점이다.

< 결과 분석 >

3가지 모델을 각각 따로 실행 시켰을 때 큰 성능 차이가 있을 것이라고 예상했지만, 생각보다 그렇게 큰 성능 차이가 나지는 않는 것 같았다.

단, 각 모델의 결과에서의 Loss 의 크기와 결과 문장의 정확성의 관계가 각 모델마다 조금씩 차이가 있는 것을 확인할 수 있었는데, LSTM이나 GRU의 경우 상대적으로 basicRNN보다 더 큰 Loss 값을 가져도 결과 문장이 더 올바른 문장에 가깝게 되는 경향을 확인할 수 있었다. 문장의 완성도 혹은 정확성만 놓고 비교해본다면 GRU > LSTM > basic RNN 순서의 성능을 가진 것 같다.(실행 횟수의 표본이 작기 때문에 올바른 분석이 아닐 수 있지만, 각각 모델들을 같은 횟수만큼 실행해 봤을 때 이러한 경향이 있음을 확인했다.)

또한 epoch을 50으로 제한하고 실행한 부분도 큰 성능차이를 보이지 못한 원인으로 볼 수 있을 것 같다. Epoch 숫자가 작아서 실제로 더 최적화가 될 수 있는 상태이지만 일정 횟수가 끝나면 바로 학습을 종료해버리고 결과를 반환하게 되어 있어서 원하는 대로 결과가 잘 나오지 않은 것 같기도 하다. Epoch 숫자를 조금만 더 조정해보면 각각의 모델의 성능 차이를 더 뚜렷하게 확인할 수 있을 것 같다.